AGRICULTURAL NOTES

PUBLISHED BY

PORTO RICO AGRICULTURAL EXPERIMENT STATION, MAYAGUEZ
OFFICE OF FARM MANAGEMENT, FEDERAL BUILDING, SAN JUAN

No. 12 Page 1. San Juan, Porto Rico, June, 1926.

SOME PINEAPPLE PROBLEMS.

12th ARTICLE. - OUTWARD APPEARANCE OF THE PINEAPPLE LEAF.

By Henry C. Henricksen.

This study has been conducted, almost entirely, on the Red Spanish variety. Therefore, the results described should be applied to that variety only, except in so far as the data applies to pineapple plants in general.

LEAF AREA. - With all other factors equal, the largest plant produces the largest fruit. There are apparently exceptions to that rule, as most growers are well aware, but such exceptions are due to factors having no connection with size which will be explained in later articles.

The leaf area is governed by the number and the average length and width of the leaves. The measurements here given are above the average, but they can be attained on a good grade of sandy loam soil, on the costal plains from San Juan to Arecibo, and they are the ideals to strive for. An eight months old plant should have 25 to 30 leaves, not counting the outer withered, nor the inner small ones. The average length should be 35 to 40 inches and the width 2-1/4 to 2-1/2 inches. That is, the leaf area should be approximately one square foot for each month of growth. An eighteen months old plant should have about 50 leaves of an average size of 45 to 50 x 2-1/4 to 2-1/2 inches, or at least one square foot of leaf area for each month of growth.

SPININESS. - The varieties that originated in dry rocky localities were undoubtedly very spiny before they became cultivated. The Red Spanish seems to be one of those and it has retained its original capacity for spine formation. Strains seem to have been developed that are almost smooth, but even in these spininess is present and becomes conspicuous when the environments are unfavorable for normal growth.

The leaves on a plant from a spiny strain are always spiny near the tip, which is the first part formed. But if the growth is normal and vigorous spine formation may cease after the first two to three inches of growth. If, however, the food or the water supply lessens at a later period spines will again be formed on the young growth. Therefore, it is not unusual to see leaves with spiny sections interspersed with smooth sections. This makes it, to some extent, possible to judge past growing conditions from present appearance of the leaves, as it is possible to determine growth periods of a tree by the rings in its stem.

The conditions inducing spininess seem to be especially a shortage of water or plant food or both. Abnormal growth, that results in small pale leaves, does not always produce spininess except when it is connected with a water and food shortage. Therefore, plants grown on light sandy soils are much more liable to be spiny, especially in sections, than those grown on heavier soils that are more retentive of water and fertilizer salts.

COLOR. - The various bronze hues of the normal pineapple leaf are due to a blending of the green color, caused by chlorophyll and the red color caused by anthocyanin. The chlorophyll is confined almost entirely to the layer of spongy tissue at the lower side of the leaf, while the anthocyanin is normally confined to the epidermis of the upper side. The amount of chlorophyll present is governed by a number of factors that are very important to normal growth. Hence, it is usual to judge the state of growth of the pineapple plant by the color of its leaves. A dark green color denotes normality, whereas a light green, yellowish, reddish or nearly white color are unfailing signs of abnormal growth. That is, up to the time of fruit formation. At the time of fruit maturity the leaves always become more or less pale for they then gradually cease to function, which results in the chlorophyll being destroyed faster than it is formed. Light is the main factor in the destruction of chlorophyll which is well demonstrated by the difference in color of shaded and unshaded plants. Also slips and suckers may be left for months in the shade without changing color whereas a few weeks exposure to the sun will cause them to bleach.

The red color, while present almost entirely in the epidermis on the upper side of the leaf, may also form in the epidermis on the lower side, if the plant is turned so as to expose the lower side to the sunlight. Also in leaves, from which the chlorophyll has nearly disappeared, a great deal of anthocyanin may be found in the epidermis on the lower side. This indicates that anthocyanin is formed especially in parts that are not, to some extent, shielded from strong light. And that has led to the general belief that a plant forms red color to protect its chlorophyll from destruction by strong light, whenever conditions are such that chlorophyll cannot form as fast as it is destroyed. Whether or not it does actually serve such purpose in the pineapple plant it has not been possible to determine, in this investigation, for there has been no facilities for doing that kind of work. It has been possible, however, to prove that abnormal anthocyanin formation is correlated with abnormal sugar formation, as is well known to be the case with other plants.

While a small amount of red color seems to be normal to the Red Spanish plant a large amount always denotes abnormality. For instance, plants fertilized with potassium nitrate will be practically free from it and as a result the color of the leaves will be entirely green instead of the bronze hue characteristic of the normal plant. Abnormality in such a leaf is not expressed in color only, but also in shape, size and chemical composition as will be explained in a later article.